Montana Fish, Wildlife & Parks

1400 South 19th Avenue
Bozeman, MT 59718

March 24, 2017

Dear Interested Party,

Montana Fish Wildlife and Parks (FWP) is proposing to restore native westslope cutthroat trout (WCT) in Bender, Doolittle and Andrus creeks. These streams are home to aboriginal populations of non-hybridized westslope cutthroat trout which have become greatly reduced in distribution and numbers due to brook trout competition and predation. It is likely that these cutthroat trout populations will be extirpated in the next 10 years if conservation actions are not taken. Fish barriers which would preclude upstream fish passage would need to be constructed in the streams to isolate the native cutthroat from non-native fish downstream. WCT upstream from the barriers would be salvaged and then reintroduced after completion of the project. Once the barrier is in place and WCT salvage has been completed, non-native trout upstream of the fish barriers would be removed using the piscicide rotenone likely in the formulation of CFT Legumine (5% rotenone). This restoration project would result in expanding the range of WCT in Bender Creek from less than ½ mile of stream to over 4 miles of stream. The range of WCT in Doolittle Creek would be expanded from 1 mile of occupied habitat to over 11 miles of habitat and the range in Andrus Creek would be expanded from 3 miles to 10 miles.

This EA is available for review in Helena at FWP's Headquarters, the State Library, and the Environmental Quality Council. It also may be obtained from FWP at the address provided above, or viewed on FWP's internet website: http://www.fwp.mt.gov.

Montana Fish, Wildlife & Parks invites you to comment on the attached proposal. Public comment will be accepted until April 24, 2017 @ 5:00 pm. Comments should be sent to the following:

Montana Fish, Wildlife & Parks
Bender, Doolittle, Bender and Andrus native fish restoration
Attn: Jim Olsen
1820 Meadowlark Ln.
Butte, MT 59701

Or e-mailed to: jimolsen@mt.gov

Sincerely,

Sam B. Sheppard
Region Three Supervisor

MONTANA FISH, WILDLIFE & PARKS
FISHERIES DIVISION

Environmental Assessment for Native Fish Restoration in Bender Doolittle and Andrus creeks in the Big Hole River Drainage

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: The proposed action would restore native westslope cutthroat trout (WCT) in Bender, Doolittle and Andrus creeks. These streams are home to aboriginal populations of non-hybridized westslope cutthroat trout which have become greatly reduced in distribution and numbers due to brook trout competition and predation. It is likely that these cutthroat trout populations will be extirpated in the next 10 years if conservation actions are not taken. Fish barriers which would preclude upstream fish passage would need to be constructed in the streams to isolate the native cutthroat from non-native fish downstream. WCT upstream from the barriers would be salvaged and then reintroduced after completion of the project. Once the barrier is in place and WCT salvage has been completed, non-native trout upstream of the fish barriers would be removed using the piscicide rotenone likely in the formulation of CFT Legumine (5% rotenone). This restoration project would result in expanding the range of WCT in Bender Creek from less than ½ mile of stream to over 4 miles of stream. The range of WCT in Doolittle Creek would be expanded from 1 mile of occupied habitat to over 11 miles of habitat and the range in Andrus Creek would be expanded from 3 miles to 10 miles.

B. Agency Authority for the Proposed Action:

- FWP is required by law (§87-1-201(9)(a) Montana Code Annotated [MCA]) to implement programs that manage sensitive fish species in a manner that assists in the maintenance or recovery of those species, and that prevents the need to list the species under § 87-5-107 MCA or the federal Endangered Species Act. Section 87-1-201(9)(a), M.C.A.

- FWP is a signatory to the Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999, 2007) which states: "The management goal for WCT in Montana is to ensure the long-term, self-sustaining persistence of the subspecies within each of the five major river drainages they historically inhabited in Montana, and to maintain genetic diversity and life history strategies represented by the remaining local populations."

- According to the FWP Statewide Fisheries Management Plan, the restoration goal for WCT east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River) is to restore secure conservation populations of WCT to 20% of the historic distribution (FWP 2012). Populations of WCT are considered secure by FWP when they are isolated from non-native fishes, typically by a physical fish passage barrier, have a population size of at least 2,500 fish, and occupy sufficient (5 to 6 miles) habitat to assure long-term persistence. Currently WCT (including slightly hybridized population > 90% WCT) occupy approximately 5% of their historic habitat.

C. Estimated Commencement Date: Bender Creek:

Barrier Construction: Summer 2017
Fish removal: Aug-Sept 2017-2018

Doolittle Creek:

Barrier Construction: Summer 2020 (or beyond depending on funding)
Fish removal: 2016 (South Fork only), 2021 (and beyond) entire drainage.

Andrus Creek

Barrier Construction: 2017
Fish Removal: 2018 and 2019 if necessary

D. Name and Location of the Project: Environmental Assessment for Native Fish Restoration in Bender, Doolittle and Andrus creeks in the Big Hole River Drainage

Bender Creek is in Beaverhead County approximately 15 miles northwest of Wisdom, Montana T1S R23E Sec 12.

Doolittle Creek is in Beaverhead County approximately 10 miles northeast of Wisdom Montana T1S R14W Sec 27, 28, 33, 34.

Andrus Creek is in Beaverhead County approximately 10 miles southeast of Jackson, Montana T7S R14W Sec 5, 17, 18, 20, 21, 22,26, 35.

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian –There are approximately 4 miles of Bender Creek, 11 miles of Doolittle Creek and 10 miles of Andrus Creek within the proposed project for a total of roughly 25 miles of stream.
5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

The cutthroat trout is Montana's state fish. Westslope cutthroat trout *Oncorhynchus clarkii lewisi* (WCT) were first described by the Lewis and Clark Expedition in 1805 near Great Falls, Montana, and are recognized as one of 14 interior subspecies of cutthroat trout. The historical range of WCT includes Idaho, Montana, Washington, Wyoming, and Alberta, Canada. In Montana, WCT occupy the Upper Missouri and Saskatchewan River drainages east of the

Continental Divide, and the Upper Columbia Basin west of the Divide. Although still widespread, WCT distribution and abundance in Montana has declined significantly in the past 100 years due to a variety of causes including introductions of nonnative fish, habitat degradation, and over-exploitation (Hanzel 1959, Liknes 1984, McIntyre and Rieman 1995, Shepard et al. 1997, Shepard et al. 2003). Reduced distribution of WCT is particularly evident in the Missouri River drainage where genetically unaltered WCT are estimated to persist in less than 5% of the habitat they once occupied, and most remaining populations are restricted to isolated headwater habitats (Shepard et al. 2003; Shepard et al. 2005). Further, many of these remaining populations are at risk of extirpation due to small population size and the threats of competition, predation and hybridization with non-native trout species.

The declining status of WCT has led to its designation as a *Species of Special Concern* by the State of Montana, a *Sensitive Species* by the U.S. Forest Service (USFS), and a *Special Status Species* by the Bureau of Land Management (BLM). In addition, in 1997 a petition was submitted to the U.S. Fish and Wildlife Service (USFWS) to list WCT as "threatened" under the *Endangered Species Act* (ESA). USFWS status reviews have found that WCT are "not warranted" for ESA listing (DOI 2003); however, this finding was in litigation until 2008 and additional efforts to list WCT under ESA are possible.

In an effort to advance range-wide WCT conservation efforts in Montana, a Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana was developed in 1999 by several federal and state resource agencies (including the BLM, Montana Fish, Wildlife & Parks [FWP], the USFS, and Yellowstone National Park [YNP]), non-governmental conservation and industry organizations, tribes, resource users, and private landowners (FWP 1999: MOU). The MOU outlined goals and objectives for WCT conservation in Montana, which if met, would significantly reduce the need for special status designations and listing of WCT under the ESA. The MOU was revised and endorsed by signatories in 2007 (FWP 2007). As outlined in these MOU's, *the primary management goal for WCT in Montana is to ensure the long-term self-sustaining persistence of the subspecies in its historical range*. This goal can be achieved by maintaining, protecting, and enhancing all designated WCT "conservation" populations, and by reintroducing WCT to habitats where they have been extirpated.

The primary goal of cutthroat trout restoration is to create secure populations. A secure population is one that is isolated from the threats of non-native species (usually by some sort of fish barrier) and occupies adequate habitat and at a high enough density to have a high probability of persisting through time. Hilderbrand and Kershner (2000) recommended a 2,500 fish minimum WCT population size for long-term persistence (>100 years) and Harig and Fausch (2002) recommended the minimum amount of occupied habitat per population is 5.6 square miles (minimum watershed size) for increased likelihood of success of translocation projects. In the Big Hole River drainage WCT historically occupied approximately 2,141 miles of stream. Today there are a total of 47 remaining WCT populations mostly occupying small headwater streams. Of these 47 populations, only 1 is considered secure. The other 46 populations, occupying 126 miles of stream (6% of historically occupied habitat), are at risk. An at-risk population is one that is not likely to persist over the long-term because of poor habitat, small population size and/or the presence of non-native species. There are 4 additional WCT populations in the Big Hole considered protected but not secured because they exist above a natural fish barrier where there are no non-native fish but they are at risk of extirpation from catastrophic events (e.g., fire, drought) and may eventually suffer negative consequences of genetic inbreeding. If actions are not taken to conserve the remaining cutthroat populations in the Big Hole, more populations will be lost. Data collected from streams in the Big Hole drainage over the past 6 years indicate that many of the WCT populations in the drainage have dramatically declined or have been completely extirpated (Olsen 2010). Projects that restore WCT are necessary to ensure the continued survival of the species.

The long-term goal for WCT conservation according to the FWP Statewide Fisheries Management Plan is to restore secure conservation populations of WCT to 20% of their historic distribution east of the Continental Divide (Upper Missouri River Basin upstream from and including the Judith River; FWP 2012). In the Big Hole River drainage where WCT historically occupied approximately 2,141 miles of stream, the restoration goal is roughly 400 miles of streams restored to secured WCT populations. The remaining 80% of streams in the drainage would be managed for non-native sport fish such as brook, rainbow and brown trout.

Recently, significant progress has been made toward WCT conservation in the upper Missouri River basin, including the Big Hole River drainage. There have been 30 projects completed basin-wide over the past 10 years which have resulted in securing 226 miles of stream for WCT with plans to complete several more projects in the next few years. Considering that as of 2008, WCT occupied only 466 of the 11,041 miles of historically occupied habitat (4.2%), the recent restoration of over 200 miles of stream represents a 50% increase in WCT populations in the upper Missouri River system. An additional 16 WCT restoration projects have been conducted in the lower Missouri River downstream of Holter Dam that have restored 88.5 miles of stream for cutthroat trout. In the Big Hole River drainage there have been 13 projects completed over the past 5 years totaling 66 miles of stream that have been secured for westslope cutthroat trout. Restoration of WCT to Bender, Doolittle and Andrus creeks would add an additional 25 miles of stream for native fish for a total of 104 miles, which would be over 25% of goal for the Big Hole drainage.

The goal of the proposed project is to restore WCT to Bender, Doolittle and Andrus creeks in the Big Hole River drainage. Genetic evidence indicates that all three streams harbor non-hybridized populations of WCT (Leary 2014, 2015). In Bender Creek the WCT are isolated to less than ½ mile of habitat near the headwaters of the stream. In Doolittle Creek WCT are isolated to approximately 1 mile of stream in the headwaters of the South Fork and only present in about 2.5 miles total in Bailey and Thayer in Andrus Creek.. The remaining length of these streams has been taken over by non-native brook trout and WCT have been extirpated. To restore WCT to these streams non-native trout would be removed using the piscicide rotenone in the formulation of CFT Legumine and a fish barrier would need to be constructed to prevent brook trout recolonization. Prior to brook trout removal, the streams would be electrofished and any remaining WCT would be salvaged and held in water that would not be treated. Once the brook trout are removed (removal is anticipated in 1 or 2 treatments of the streams), the native WCT would be released back to the stream. Additional information about each stream is given below followed by a more detailed explanation of fish removals.

Bender Creek

Bender Creek is a tributary to Johnson Creek which drains into the North Fork Big Hole River near the Big Hole National Battlefield. It drains from the Pintler Mountains north of Wisdom (Figure 1) and the entirety of the proposed project area is located on the Beaverhead-Deerlodge National Forest. Roughly 80% of the Bender Creek drainage was burned in the 2007 Rat Creek Wildfire. The fire burned intensely in the drainage and very few live trees were left. Only the headwaters of the stream were not burned. The stream habitat is heavily influenced by large inputs of lodgepole pine and spruce trees that have fallen into and across the stream channel. This has resulted in excellent stream habitat with abundant pools and spawning gravels. The lower reaches of Bender Creek upstream of the Forest Service Road 1203 crossing and the headwaters of the stream are low gradient with a meandering stream channel, abundant gravels and some beaver activity. The remaining stream channel is moderate gradient with primarily cobble and boulder substrates with abundant large wood in and across the channel. A maintained Forest Service Trail extends from Road 1203 to the headwaters of the drainage and provides good foot access.

The fishery in Bender Creek consists of brook trout and an isolated remnant population of non-hybridized WCT at the headwaters of the stream. Brook trout, which are native to eastern North America, were likely introduced to the Big Hole drainage in the late 1800's or early 1900's. There is no stocking record of brook trout in Bender Creek but stocking records in the late 19th and early 20th centuries are scant. Prior to brook trout introduction, WCT would have been the only trout species to inhabit Bender Creek. Brook trout have displaced cutthroat trout throughout the entire stream except in the headwaters where a small population of cutthroat (approx 50 fish) remains. The reason for the persistence of cutthroat in the headwaters is that a small cascade has historically precluded upstream brook trout passage; however, in 2012 brook trout were found in Bender Creek upstream of the cascade. The presence of brook trout in the headwaters of the stream will likely expedite the extirpation of the cutthroat trout from the drainage unless restoration actions are taken.

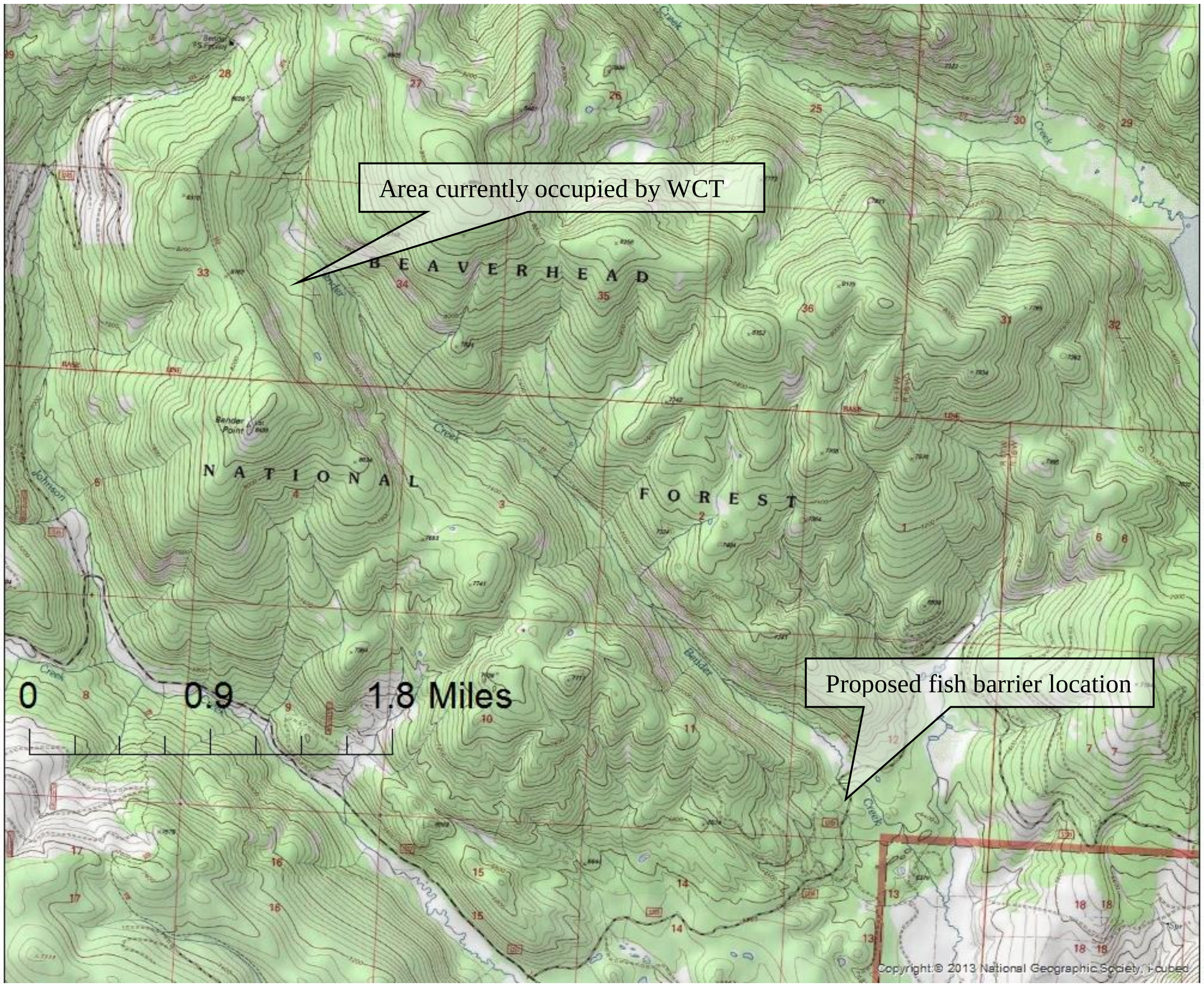

Figure 1. Bender Creek drainage located 15 miles northwest of Wisdom, MT.

In order to conserve WCT in Bender Creek, FWP is proposing to construct a fish barrier in the stream immediately upstream of the Forest Service Road 1203 bridge crossing (Figure 2). A fish barrier at this location would isolate 4 miles of stream upstream for cutthroat trout restoration and would expand the amount of habitat occupied by WCT from ½ mile to 4 miles. The site proposed for the fish barrier was chosen because of its accessibility and favorable geomorphic characteristics for barrier construction. The bridge over Bender Creek is very large relative to the size of the stream (Figure 2) and there are large amounts of fill on either side of the bridge to match the elevation of the road to the elevation of the bridge deck. The proposed fish barrier would tie into this road fill to prevent the stream from going around the barrier structure during high water. The proposed fish barrier would be constructed of treated lumber similar to the barrier constructed on McVey Creek in the Big Hole drainage (Figure 3). The fill and riprap necessary for barrier construction would be obtained on site from the hill slopes adjacent to the road. Construction of the barrier in this location should have no impact on the integrity of the bridge or its ability to pass flood flows. The barrier is designed such that it will pass a 100-year flood event without overtopping. The throat of the fish barrier structure is 8 ft wide which is roughly the bankfull width of the stream. Because of the abundance of wood in the stream channel there is a risk of the barrier throat becoming blocked with wood. However, because of the small size of Bender Creek relative to the large size of the trees in the stream, whole trees are not readily transported down the stream channel. There is little evidence in other areas of the drainage of log jams which have formed over the past 10 years since the fire. The low probably of wood being transported down the stream reduces the risk that the barrier could become clogged with woody debris. During construction, any wood in the immediate vicinity of the barrier and pool it would create upstream would be removed with an excavator and placed away from the stream. Annual inspection of fish barrier will be performed and any wood accumulating on the barrier would be removed.

Once a fish barrier is in place in Bender Creek, the remaining WCT in Bender Creek would be salvaged and held in waters outside the project area. Next non-native brook trout would be removed through the application of a piscicide such as rotenone. The formulation of rotenone that would likely be used is CFT Legumine (5% rotenone) and it would be applied to the stream at a concentration of 1 part per million parts of water. It is anticipated that the chemical would remain active in the stream less than 24 hours; however, the presence of beaver dams near the barrier site may reduce natural breakdown rates so it may be present up to 3 days. Rotenone would be neutralized at the fish barrier site using potassium permanganate. Neutralization of the piscicide will prevent any impacts of rotenone on fish in Bender Creek downstream of the fish barrier. Fish removal in Bender Creek would likely take 2-4 days. Once brook trout are removed and no rotenone is present in the water they would be released. The WCT in Bender Creek would be monitored over the next 5-10 years to determine their response to restoration. Because of the very small population size, it is possible that there could be genetic impacts (genetic bottleneck and founder effect) that may impact the population even in the absence of brook trout. Monitoring the expansion of the fish population will aid in determining if there are potential genetic factors limiting the population expansion. If it is determined that there are potential genetic limiting factors, importing WCT from either nearby Hellroaring Creek or Plimpton Creek, which also have non-hybridized WCT, would be considered which would breakdown any inbreeding or bottleneck effects.

Figure 2. Bender Creek bridge crossing of Forest Service Road 1203.

Figure 3. Fish barrier on McVey Creek which would be similar to the one proposed on Bender Creek.

Doolittle Creek

Doolittle Creek is a tributary to the Big Hole River approximately 10 miles northeast of Wisdom (Figure 4). The upper 2/3 of the drainage, and the entire proposed project area, is located on the Beaverhead-Deerlodge National Forest. Doolittle Creek is formed by 3 major forks: North Fork, Middle Fork and South Fork. The majority of habitat in the mainstem creek and the forks within the proposed project area consists of a moderate gradient stream channel with few pools and large cobble and boulder stream substrates. The Middle and South forks of the creek have small meadow reaches and there is some beaver activity in the South Fork. The stream is heavily forested with lodgepole pine and spruce trees with few willows except in the meadow reaches of the streams where willows are more common.

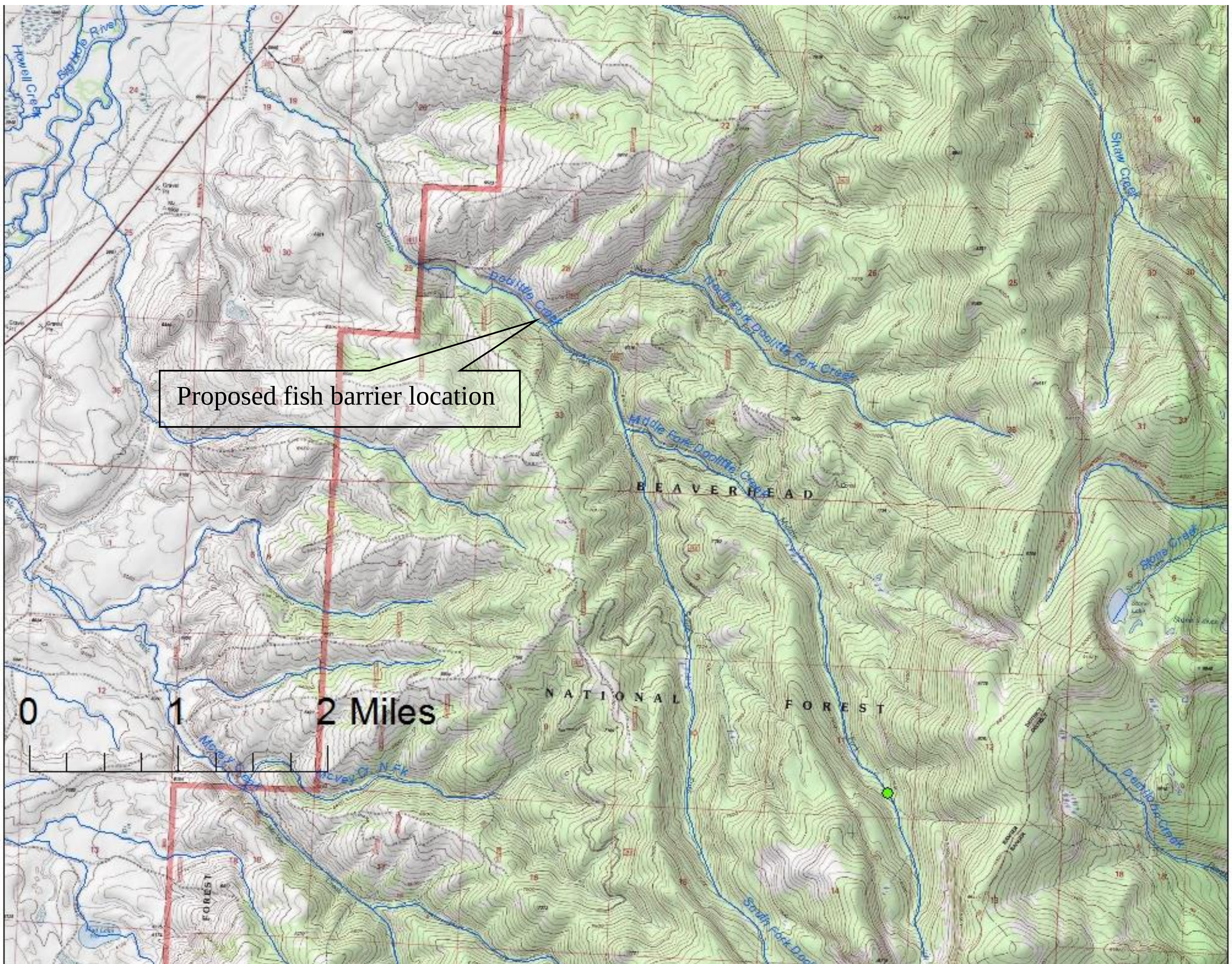

Figure 4. Map of Doolittle Creek drainage located approximately 10 miles northwest of Wisdom, MT.

The fishery in Doolittle Creek consists primarily of non-native brook trout. There is no brook trout stocking record for Doolittle Creek but, similar to Bender Creek, the early stocking records are incomplete. As recent as 20 years ago WCT were present in all 3 forks of the stream but in the intervening years WCT have been extirpated from the North and Middle forks due to competition and predation from brook trout. WCT have persisted in the headwaters of the South Fork and recent genetic testing indicates that these fish are 100% WCT. The WCT in the South Fork are limited to the upper 1 mile of stream and the population in this location is sympatric with brook trout. In 2016 a total of 112 WCT were captured during electrofishing efforts in the stream. It is likely there are less than 200 WCT left in the South Fork.

In 2013 a WCT restoration project was conducted in the North Fork of Doolittle Creek. A fish barrier was created at the crossing of the Doolittle Creek Road and brook trout were removed upstream of this location using rotenone. Approximately 50 WCT from the South Fork of Doolittle Creek were transplanted to the North Fork to reestablish WCT in the North Fork. WCT occupy approximately 2 miles of stream in the North Fork. The restoration project in the North Fork was considered a temporary stopgap measure to ensure that the native fish from the drainage were not lost; however, because the stream is small and the habitat is limited the fish population is at a relatively high risk of extirpation through time.

To achieve long-term conservation of WCT in Doolittle Creek, a fish barrier would need to be constructed in the mainstem of the creek. A fish barrier in the mainstem of the creek would isolate the maximum amount of habitat and thus increase the probability that WCT would persist over the long run. A suitable fish barrier location in the mainstem of Doolittle Creek has been identified downstream of the confluence with the North Fork. A fish barrier at this site would isolate approximately 11 miles of stream habitat and would include all 3 forks of Doolittle Creek. The barrier being proposed would consist of a small (approximately 7 ft high) dam across the creek and floodplain with a concrete spillway. The concrete spillway would have 2 drops which would collectively preclude upstream fish passage. A similar barrier structure has been constructed on Cherry Creek in the Big Hole River drainage near Melrose (Figure 5).

Once the fish barrier is in place, WCT in the South Fork Doolittle Creek would be salvaged and held in waters not treated with rotenone (potentially in the North Fork upstream of the fish barrier). Next, non-native brook trout would be removed using rotenone. The North Fork of Doolittle Creek would not be treated with rotenone unless brook trout are found in the stream upstream from the barrier. The rotenone applied to Doolittle Creek would be neutralized at the proposed fish barrier; therefore, there will be no fish affected downstream of the immediate project area. Once brook trout are removed, the salvaged WCT from the South Fork would be released and used to repopulate the drainage.

The construction of the Doolittle fish barrier in not anticipated to be completed sooner than 2020 due to funding and other ongoing projects. In the interim, brook trout removal would be initiated in the South Fork to ensure this population is not extirpated and potentially increase its abundance prior to complete brook trout removal. In the upper reaches of the stream where brook trout are sympatric with WCT, electrofishing would be used to remove brook trout. In the lower reaches of the South Fork where no WCT are present, rotenone would be used to remove brook trout. This effort is not intended to completely eliminate brook trout from the South Fork but to reduce their abundance to allow expansion of WCT in the stream prior to barrier construction and full restoration.


Figure 5. Cherry Creek fish barrier near Melrose, MT, which is similar to the one proposed for Andrus and Doolittle creeks.

<u>Andrus Creek</u>

Andrus Creek is a tributary to Governor Creek in the headwaters of the Big Hole River south of Jackson, MT. The headwaters of the stream are located on the Beaverhead-Deerlodge National Forest but the lower portions down to the confluence with Governor Creek are located on private property owned and managed by the Hairpin Ranch. Andrus Creek has multiple tributary streams including Pine Creek, Bailey Creek and Thayer Creek. Andrus Creek and many of its tributaries have high quality habitat with a mix of low gradient meandering stream channels with frequent high quality pools and abundant gravels and moderate gradient reaches with more boulder and cobble type substrates.

Andrus Creek and its tributaries were last surveyed in 2008 and 2009 (Olsen 2011). At that time tributary streams including Bailey, Thayer and unnamed tributaries contained populations of cutthroat trout. Genetic testing indicated that these fish were non-hybridized WCT. Additional cutthroat trout populations are present in tributaries to Governor Creek which are outside of the proposed project area. Brook trout are also present throughout the watershed. Peterson Lake has a self-sustaining population of rainbow trout and is also stocked with WCT. Cutthroat trout were more common in the headwaters of Thayer Creek and Bailey Creek and the lower reaches of these streams were dominated by brook trout. Only brook trout have been documented in Pine and Peterson creeks.

To achieve long-term conservation of WCT in Andrus Creek, a fish barrier would need to be constructed in the mainstem of the creek. Two possible locations exist for a fish barrier on the stream. The first would be downstream of Bailey Creek. At this location, the stream has a moderate floodplain width (200 ft) contained by abrupt hillslopes. The stream is moderate gradient with mostly cobble and small boulder substrates. A fish barrier at this location would isolate approximately 10 miles of habitat in Andrus, Bailey, and Thayer creeks (Figure 6, Barrier site 1). The second location is near the confluence of Pine Creek. This barrier location has a wide floodplain (nearly 1000 ft) and a low gradient stream channel. A fish barrier at this location would require the construction of a significant earthen berm across the floodplain with a concrete spillway. A fish barrier at this site would isolate approximately 23 miles of stream habitat including the area for barrier site 1 and Pine Creek, Peterson Creek and Peterson Lake. Due to the low gradient of the stream channel a fish barrier at this location would create a pond upstream that would likely be 5-10 acres. A similar barrier structure has been constructed on Cherry Creek in the Big Hole River drainage near Melrose (Figure 5). Both barrier locations would be on private property on the Hairpin Ranch. The final barrier location has not been selected at the time of writing of this document because final engineering and alternative assessments have not been completed.

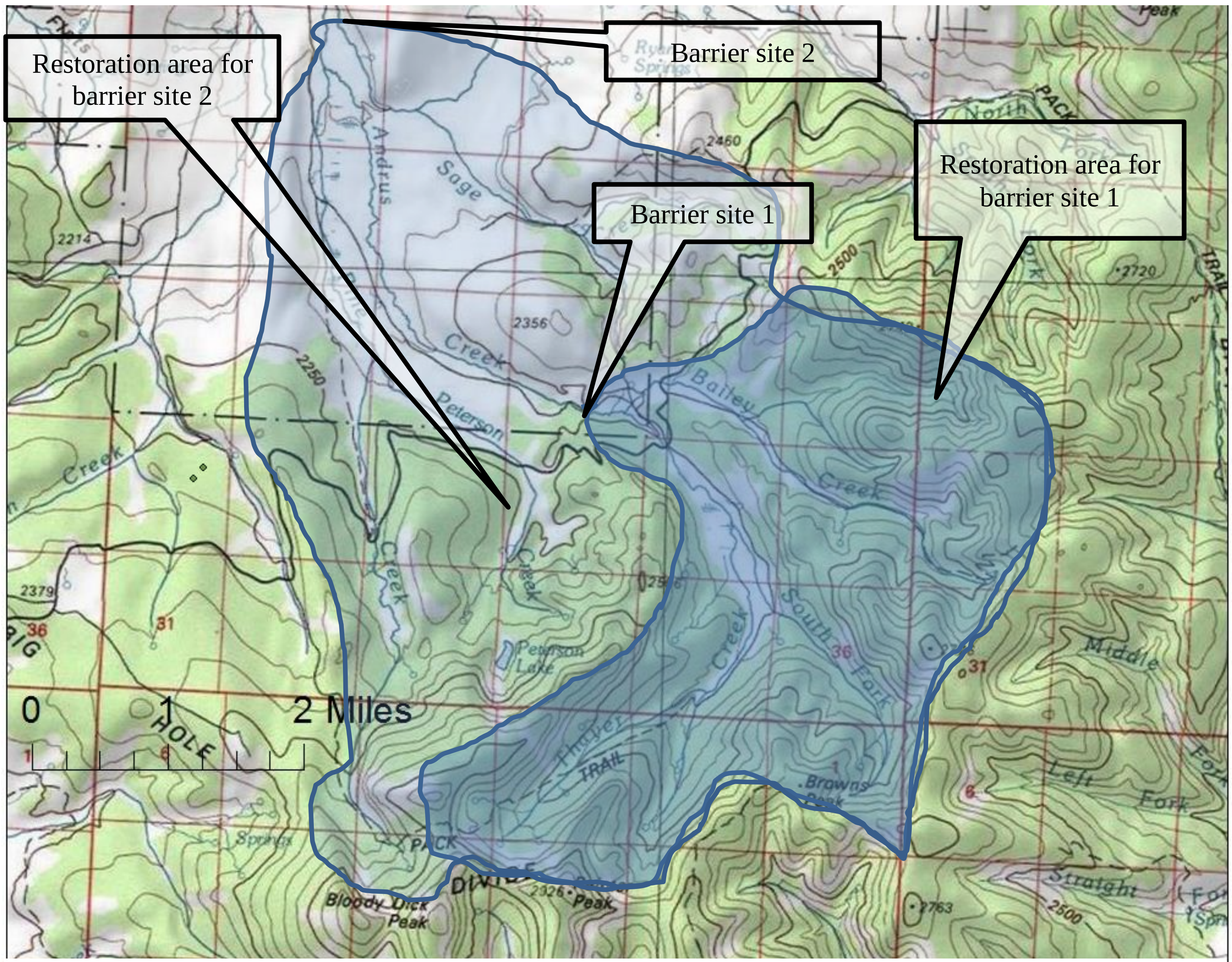

Figure 6. Map of the Andrus Creek watershed depicting the 2 potential barrier locations and the area upstream they would isolate for cutthroat trout restoration.

Once the fish barrier is in place, WCT in Andrus Creek and its tributaries upstream of the fish barrier would be captured using electrofishing and held in live car cages. Next, non-native brook trout would be removed by applying rotenone to the waters upstream of the barrier. The rotenone applied to Andrus Creek would be neutralized at the fish barrier using potassium permanganate; therefore, there will be no fish affected downstream of the immediate project area. Once the rotenone is no longer present in the water (1-2 days after treatment), the salvaged WCT would be released and used to repopulate the drainage. Electrofishing and Environmental DNA techniques would be used the following year after the initial removal to verify that brook trout were completely removed. If brook trout are found, the process of salvaging cutthroat trout and treating with rotenone would be repeated.

<u>Review of Rotenone Application</u>

Rotenone is a commonly used piscicide that is highly targeted at fish and has no impact on other terrestrial plants and animals and few impacts to non-target aquatic life at fish killing concentrations. FWP has a long history of using rotenone to manage fish populations in Montana that span as far back as 1948. The department has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s.

Rotenone acts by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals, birds and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream and are therefore not affected at fish killing concentrations. The most common route of exposure to non-gill breathing animals is through ingestion. There is little risk to animals that consume rotenone treated waters or killed fish because rotenone is readily broken down by digestive processes and is not well absorbed through the digestive system and thus terrestrial animals can tolerate exposure to concentrations much higher than those used to kill fish.

The formulation of rotenone that would likely be used for these projects is CFT Legumine which contains 5% rotenone. The label requirements for product concentration in streams is 1 part CFT Legumine to 1 million parts water (1ppm). Spring areas may also be treated with the powder formulation of rotenone (Prentox, 7% rotenone) or a sand/powder mix to prevent fish from seeking these areas as freshwater refuges during the application. The proposed streams would be treated using drip stations which are containers that administer diluted rotenone to the stream at a constant rate. These drip stations would administer rotenone to the stream at a rate of 1 ppm for 4 hours. In addition, backwaters, spring areas and small tributaries would be treated with backpack sprayers according to the CFT Legumine label specifications. The total amount of rotenone to be applied to each stream is unknown because the amount is dependent on the flow rate of the stream and the distance downstream the chemical would remain active (determined by on-site testing at the time of the treatment). Assuming a stream is flowing 3 cfs and there is 4 miles of stream and the chemical remains active for 0.75 miles (i.e., 0.75 mile spacing between application points), 3 liters of CFT Legumine would be required to treat the entire 4 miles of stream. It is expected that fish killing concentrations of Legumine would be present in the streams for approximately 24-48 hrs after application, after which time it would have naturally detoxified and diluted to below fish killing concentrations.

To prevent the rotenone from traveling downstream of the proposed treatment area, potassium permanganate would be used to neutralize any rotenone remaining in the stream at the fish barrier site (see Comment 2a below). The CFT Legumine label states that a minimum of 20-30 minutes of contact time between rotenone treated waters and the applied neutralizing agent (potassium permanganate) is necessary to fully detoxify the rotenone; therefore, a detoxification zone would exist below the fish barrier the distance water travels in 30 minutes. This distance is determined by a stream dye test and is generally less than ¼ mile in length. Potassium permanganate is readily oxidized by natural processes in the stream and therefore it is imperative that adequate permanganate be applied to the stream to still be present and active at 30 min of travel time downstream. The determination of the appropriate amount of permanganate to fully neutralize any remaining rotenone is derived by on-site testing. Stream discharge would be measured prior to detoxification and the potassium permanganate would be applied at the rate specified on the CFT Legumine label (3-5 ppm) and adjusted based on on-site testing results. Neutralization would commence according the FWP Rotenone Detoxification Policy which states that detoxification with potassium permanganate will begin no less than 2 hours before the theoretical arrival time of treated waters at the detoxification station. A chlorine meter would be used to monitor the presence of $KMnO_4$ at the end of the detoxification zone to ensure that 0.5-1.0 ppm $KMnO_4$ is present and that the rotenone is completely neutralized. In addition to direct measurement of the $KMnO_4$ in the water, caged fish (westslope cutthroat trout from the Anaconda Hatchery, or brook trout captured from streams) would be placed in the stream to monitor the effectiveness of the detoxification station during the treatment. Caged fish would be placed downstream of the detoxification zone and monitored. Distress or the lack thereof in these caged fish indicates whether or not the detoxification station is effectively neutralizing the rotenone. Caged fish placed in the creek immediately upstream of the detoxification station indicate when rotenone is no longer present in the stream and when detoxification is no longer required. The label states that if caged fish in treated stream water show no signs of distress within 4 hours, the stream water is considered no longer toxic, and detoxification can be discontinued. Neutralization would continue until the theoretical time in which all treated waters have passed the fish barrier and when sentinel fish can survive for an additional 4 hours. It is anticipated that this would occur in the proposed streams within 24-48 hrs after rotenone application. The presence of beaver dams in Bender Creek may lengthen the time rotenone is active in stream to 72 hrs.

Dead fish resulting from the rotenone treatment in the streams would be left on-site in the water. Studies in Washington State indicate that approximately 70% of rotenone-killed fish sink and do not float (Bradbury 1986) and decompose within a week or two. Dead fish stimulate plankton and other invertebrate growth and aid in invertebrate recovery following treatment.

If all the brook trout are not removed during the first treatment, it may be necessary to implement a second treatment the following year to achieve the desired objectives of complete removal of non-native fish. To determine if complete fish removal is achieved, streams would be electrofished the spring and summer following treatment. Environmental DNA (EDNA) testing may also occur to determine if brook trout have been completely removed. EDNA tests stream water for the presence of DNA from specific fish species and can detect the presence of fish at very low abundance which is sometimes difficult using electrofishing techniques. A second treatment would be proposed for the following year if the objectives of the project were not met after the first treatment and non-native fish were found in the streams. In the event that an additional treatment is necessary, landowners, stakeholders and other interested parties would be notified.

Rotenone would be applied to the South Fork of Doolittle Creek prior to the construction of a fish barrier in an attempt to reduce brook trout abundance and allow WCT to expand. It is not anticipated that the barrier in Doolittle Creek will be constructed prior to 2020. In the intervening time suppression of brook trout in this fork of the stream could allow cutthroat numbers to grow. Suppression would include electrofishing and removal of brook trout in reaches of the South Fork where the two species are sympatric. In the lower reaches of the South Fork where only brook trout are present a limited application of rotenone would be performed to reduce brook trout abundance. Additional WCT in the South Fork would greatly facilitate the repopulation of the drainage once the barrier is constructed in the mainstem creek and brook trout are completely removed. A limited application of rotenone in the South Fork of Doolittle Creek would not require detoxification because of natural detoxification and dilution from the Middle and North forks of the creek.

To keep the public from being exposed to rotenone treated waters public roads and other access points (i.e., trailheads) would be signed during the stream treatments. Additional signs would be placed at stream crossings informing the public of the presence of treated waters and to keep out.

PART II. ALTERNATIVE

Alternative 1 – No action

The no action alternative would allow status quo management to continue. The brook trout fisheries in all 3 streams would remain the same. The “No Action” alternative would not fulfill the State’s obligation to conserve native fish species and would not aid in preventing their listing as Threatened or Endangered under the Endangered Species Act. Also, if no action is taken in these streams it is likely that within 10 years the native populations of WCT left in Bender, Doolittle and Andrus creeks would be lost. The loss of any native fish populations would be a large set-back for WCT conservation. There are only 14 remaining non-hybridized populations of westslope cutthroat trout in the Big Hole drainage. Although the ‘no action” alternative would not accomplish the goals of WCT conservation, it would not have the potential negative impacts of the proposed action such as temporary impacts of rotenone on non-target aquatic invertebrates. The No Action alternative would also have the fewest impacts to recreation and fishing in the area. The No Action Alternative would maintain the existing fisheries and provide uninterrupted opportunities for angling as opposed to the proposed action which would result in the temporary reduction of numbers of fish in the stream between when brook trout are removed and when the WCT are released and begin to repopulate the stream.

Alternative 2 – Proposed Action: Restoration of westslope cutthroat trout in Bender, Doolittle and Andrus creeks through the removal of non-native brook trout using rotenone and salvaging of native fish.

Remaining WCT in Bender, Doolittle and Andrus creeks would be captured using electrofishing and held in freshwater. Non-native trout would be removed from the streams upstream of fish barriers using rotenone in the formulation of CFT Legumine (5% rotenone). The rotenone would be detoxified within ¼ mile downstream of the fish migration barriers using potassium permanganate to prevent impacts to non-target areas. Once fish removal is achieved and rotenone is no longer present in the streams, salvaged WCT from each stream would be released back into Bender and Doolittle creeks. This alternative offers the highest probability of achieving the goal of conserving native fish species. Successful completion of the proposed action would result in approximately 25 miles of habitat that would be secured for WCT and 3 native populations which are at a high risk of extirpation over the next 10 years would be conserved in their native habitat.

Alternative 3 –Mechanically remove brook trout from the Bender Creek and Doolittle Creek.

This alternative would involve conserving native WCT in Bender, Doolittle and Andrus creeks through the construction of a fish barrier similar to Alternative 2, but brook trout would be removed from the streams using electrofishing rather than rotenone. Multiple-pass electrofishing has been used to eradicate nonnative trout from several small streams in northcentral Montana (Big Coulee, Middle Fork Little Belt, and Cottonwood creeks) and in SW Montana (Muskrat, Whites and Staubach creeks). Electrofishing can be an effective means of capturing fish in streams; however, electrofishing has limitations. Generally it is only 50 -70% efficient at capturing fish depending on the type of habitat and fish size distribution. Electrofishing is inefficient at capturing juvenile fish and generally electrofishing removal efforts require multiple years to allow juvenile fish to grow to the size where they can be readily captured. Electrofishing is very labor intensive. The project reaches where electrofishing removals have been successful were generally less than 3 miles in length and required up to 25 electrofishing removal passes over several years to eradicate the unwanted species. Each electrofishing pass generally requires a crew of 3 to 9 people. Eradication of brook trout from the proposed streams with electrofishing would be difficult because of the length of stream involved (25 miles total) and the complexity of the habitat, particularly in Bender Creek where there are large quantities of wood in the channel. For example, electrofishing removal efforts in McVey Creek near the town of Wisdom in the early 1990's and from 2005-2007 were not successful at achieving a significant reduction in brook trout numbers in the stream but a chemical treatment in 2008 was successful at removing all brook trout. To achieve complete removal of brook trout from the Bender Creek, Doolittle and Andrus creeks with electrofishing would require a 4 to 5 year commitment to removals, with 3 or 4 crews (6-12 people) for a minimum of 2 to 4 weeks each year. Such an effort would be impractical and cost prohibitive given other methods for accomplishing the same goals. Further, given the length of the stream and the complexity of the habitat, it is unclear whether 100% removal of hybridized trout could be achieved. For these reasons this alternative was eliminated from further consideration. Although Alternative 3 is less likely to accomplish the goals of native fish conservation, it would not have the potential negative impacts of the proposed action such as temporary impacts to non-target aquatic invertebrates. Alternative 3 would also have the greatest impact on angling because it would potentially take the longest time to completely remove brook trout before native fish could be restored.

Alternative 4: Use angling to eliminate hybridized trout from Bender and Doolittle creeks.

FWP has the authority under commission rule to modify angling regulations to remove unwanted fish from a lake or stream. Unfortunately, this method would not likely result in complete fish removal or even brook trout suppression for a number of reasons. First, the proposed streams are small and likely currently receive little fishing pressure and Andrus Creek is partially on private property where there is no public access. Attracting anglers to the streams to harvest brook trout would be very difficult because of the remoteness of the sites, small size of the streams and small size of fish. Recreational angling has been shown to reduce the average size of fish and reduce population abundance, but rarely if ever has it been solely responsible for eliminating a fish population. Using angling techniques alone in the stream would not result in removal of non-native trout and would not achieve the objective of conserving native fish. For these reasons this method of fish removal was considered unreliable at achieving the objective of complete fish removal and was eliminated from further analysis.

PART III. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u> Will the proposed action result in:	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
a. Soil instability or changes in geologic substructure?		X				
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?			X		Yes	1b
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?			X			1d
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?			X		Yes	1e

Comment 1b: The footprint of the proposed fish barrier structures and ponds immediately upstream in Bender, Doolittle and Andrus creeks will cover riparian soils and plants. The impact on soils at the barrier location should be minimal because the footprint of the structure in Bender Creek is only 2,000 square feet and the barrier on Doolittle Creek will be approximately 16,000 square feet. Depending on the location of the barrier site in Andrus Creek the footprint would be

similar to that of Doolittle Creek or be as large as 30,000 square feet. Barrier construction will also result in soils upstream of the barriers being inundated by water. However, it is anticipated that the impoundments upstream will fill with sediment and the soils in the area will become reestablished. Soil and sod salvaging will be performed to the extent practicable to be used in revegetation of the sites.

Comment 1d: The construction of fish barriers in Bender Creek, Doolittle Creek and Andrus Creek will create small impoundments of water upstream. These impoundments will slow the velocity of the stream and cause the deposition of silts and other sediments. Within a few years it is anticipated that the impoundments upstream of the barrier structures will fill with sediments and sediments will be transported over the barrier structures. Therefore, the changes in siltation patterns in the stream are anticipated to be short-term and minor and have little to no negative impacts on the stream channel or erosion downstream.

Comment 1e. Barrier structures inevitably impound water upstream and any impoundment carries the risk of failure and flooding. All barrier structures proposed herein are designed to handle flows up to the 100-year flood without over topping which should significantly reduce the risk of failure. Additionally, the structures will be inspected annually to make sure they are sound and that debris is not collecting on the spillway. The DNRC regulates high hazard dams and has set a threshold for a dam's potential to cause significant potential harm based on the amount of water it impounds upstream. If the dam impounds 50 acre-ft of water or more it is considered a high hazard dam. The barrier structure on Bender Creek has little risk of flooding because the impoundment upstream will be small and the only infrastructure within several miles of the project is the bridge located immediately downstream which has ample capacity to handle flows up to and exceeding the 500-year flood. Further, it is anticipated that the impoundment created upstream on Bender Creek as a result of barrier construction would fill with sediments within a few (5-10 years) and the amount of stored water would be negligible.

The barrier proposed in Doolittle Creek would also impound significantly less water than 50 acre-ft. The closest infrastructure downstream of the proposed barrier site is a privately-owned bridge accessing a single residence approximately 1.5 miles downstream. This bridge is in poor condition and not adequately sized to handle the flows. A new bridge was place over the top of the old failing bridge which has lessened the bridge's capacity to pass high flows. A wide heavily willowed meadow reach of stream with abundant beaver dams exists between the proposed barrier site and the bridge 1.5 miles downstream. This wide floodplain with multiple beaver ponds would aid in mitigating any flooding by attenuating flows should the barrier structure fail. Downstream of the bridge there are multiple irrigation diversions to the Highway 43 crossing. Despite the nearby infrastructure, the potential for the barrier to fail and cause flooding is minimal. The impoundment created upstream of the Doolittle fish barrier would be much smaller than the 50 acre-ft threshold. In addition it is anticipated that the impoundment created upstream would fill with sediment in 5-10 years and the amount of stored water upstream would be negligible.

The fish barrier on Andrus Creek at the upper location would also create an impoundment that would be less than 50 acre-ft. There are 2 irrigation diversion structures downstream of the proposed barrier site and 2 bridge crossings before Andrus Creek converges with Governor Creek. The bridges are adequately sized to handle flood flows and have been in place for many years without any signs of water constriction at the site. The nearest public crossing of Governor Creek is more than 10 miles downstream and is a bridge that was recently replaced and sized to handle flood flows. The upper barrier site would likely fill with sediment over a period of 10 years. The lower barrier site would be downstream of the irrigation diversions in Andrus Creek and upstream of only 1 of the bridges. This site would impound significantly more water. It is unclear if it would impound greater than 50 acre-ft of water because the site has not been thoroughly evaluated. If the site impounds over 50 acre-ft of water it will likely not be considered further as a potential barrier site because of the risk of flooding.

2. <u>WATER</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		Yes	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of flood water or other flows?		X				
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	2a,f
i. Effects on any existing water right or reservation?		X				
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m

Comment 2a: The proposed project is designed to intentionally introduce a pesticide to surface water to remove non-native trout. The impacts would be short term and minor. CFT Legumine

(5% rotenone) is an EPA registered pesticide and is safe to use for removal of unwanted fish, when handled and applied according to the product label. The concentration of rotenone proposed for use is 1 part formulation to one million parts of water (ppm).

To reduce the impact of the piscicide on water quality, a detoxification station would be established immediately downstream of the fish barrier. There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engsrtom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46^{o}F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46^{o}F pond water 14 days after a treatment. By day 18 the concentrations were sub lethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 1998, 2007). FWP expects the streams would naturally detoxify down to the fish migration barrier within 24-48 hr after application of CFT Legumine because of natural breakdown processes and dilution from freshwater sources. At the fish barrier, potassium permanganate would be used to detoxify any remaining rotenone present in the stream and prevent fish killing concentrations of rotenone from traveling more than ¼ mile downstream.

Dead fish would result from this project. Bradbury (1986) reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This is attributed to the input of phosphorus to the water from decaying fish. Bradbury further notes that approximately 70% of the phosphorus content of the fish stock would be released into the water through bacterial decay. This action may be beneficial because it would stimulate algae production and would start the stream toward production of invertebrates. Any changes or impacts to water quality resulting from decaying fish would be short term and minor.

During barrier construction, it is likely that minimal amounts of turbidity will be generated. Barrier construction will require excavation of the streambed and banks to prepare the site structure installation. Water will have to be diverted around the barrier site during construction. Although the exact method of diversion will be determined by the contractor similar projects have diverted the stream through the construction of a coffer dam across the stream channel and the water was piped or pumped around the construction area and discharged back to the stream. The turbidity generated as a result of barrier construction should be minimal because work will be done in low-water conditions and water will be diverted around the construction site such that work will be done primarily in the dry. Barrier construction in Doolittle and Andrus creeks would likely be completed in 4-8 weeks. Barrier construction in Bender Creek will likely take 2-4 days.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no evidence of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21 day period and showed no sign of contamination. In 2005, FWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well located 30 yards from the pond was tested and neither Prenfish nor inert ingredients were found in the well. In Soda Butte Creek near Cooke City, Montana a well at a Forest Service campground located 50 ft from a treated stream was tested immediately following and 10 months after treatment with Prenfish and no traces of rotenone were found (Olsen 2006). Because rotenone is known to bind readily with stream and lake substrates, FWP does not anticipate any contamination of ground water as a result of this project.

Comment 2j: The CFT Legumine label states "….Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir…" There are no irrigation diversions located within the proposed treatment areas of Bender and Doolittle creeks. Irrigation diversions are present on the mainstem of Johnson Creek downstream of Bender Creek and on Doolittle Creek downstream of the Forest Service Boundary, but none within 2 miles of either fish barrier. Any rotenone treated waters would be fully neutralized before reaching these diversions. On Andrus Creek there are irrigation diversions within the treatment area. These diversions would be closed during the treatment to prevent treated waters from going down the ditches.

Comment 2m: FWP would submit a Notice of Intent for the purpose of applying a pesticide to a stream from Montana DEQ under the Pesticide General Permit.

Cumulative Impacts: The proposed action of piscicide treatment would have a short term impact on water quality (piscicides) in Bender Creek, Doolittle Creek and Andrus Creek. Because of the rapid breakdown rate of CFT Legumine and active neutralization at the fish barriers, these impacts would attenuate through time and would not impact long-term water quality or the productivity of fisheries resources after restocking. FWP does not expect the proposed actions to result in other actions that would create cumulative impacts to water resources in the proposed streams nor does FWP foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to water resources related to treatment of proposed streams with piscicides or the associated barrier construction.

3. AIR **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X		Yes	3a
b. Creation of objectionable odors?		X				3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: Machinery that will be used to construct the fish barriers will result in the increase in exhaust fumes produced in the area. This impact should be minor and temporary as there are no air quality restrictions in the area and the amount and duration of the productions of emissions should be minimal. Airborne dust from construction work in the area will increase through the excavation of dry sediments and construction traffic. The majority of roads that will be used to perform the work described above are unimproved dirt roads and therefore, as machinery travels the roads dust will be generated. Traffic use of the access roads will increase over existing use with construction activities but the production of dust should only pose local minimal impacts to air quality and should not exceed those posed by normal traffic on the roads.

Comment 3b: The advantage of CFT Legumine over other rotenone products is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene which have a strong odor. By comparison, Prenfish has a strong chemical odor after application as opposed to CFT Legumine which is virtually odor-free and performs nearly identically to Prenfish.

Cumulative Impacts: Impacts to air quality from the proposed actions would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to air quality in the Doolittle, Bender or Andrus creeks. Nor does FWP foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to air quality related to treatment of the proposed streams with piscicides or associated barrier construction.

4. VEGETATION **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Changes in the diversity, productivity or abundance of plant species (including			X		Yes	4a

trees, shrubs, grass, crops, and aquatic plants)?						
b. Alteration of a plant community?			X		Yes	4b
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				4c
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X			4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: The construction activities proposed for the fish barriers in Bender and Doolittle creeks will have impacts on plant species present in the immediate construction area. At all 3 locations the plant species that will be affected include lodgepole pine, Engelmann spruce, various willow species and grasses and forbs. Vegetation will be removed to allow the construction of the fish barrier structures. Other vegetation impacts will occur as a result of machine traffic. These impacts are expected to be minor and temporary. Vegetation that is only affected by machine traffic is anticipated to recover within a year. Top soils and sod mats will be salvaged and replaced as part of the site reclamation after construction. All disturbed areas will be reseeded with native seed mix.

There would be some disturbance of vegetation along the stream during the proposed treatment due to increase foot traffic. These impacts should be minimal because all streams have existing trails (some primitive) or roads that provide good foot and/or vehicular access to the sites. FWP anticipates any impacts to plants resulting from trampling would be unnoticeable within 1 growing season. Rotenone does not affect plants at concentrations used to kill fish. Vegetation disturbances are expected to be short term and minor.

Comment 4c: There are 2 plant Species of Concern listed by the Montana Heritage program in the Doolittle, Bender and Andrus creek drainages. Lemhi beardtongue is listed as a Species of Concern that potentially occurs within Doolittle Creek drainage. No impact to this species is anticipated as a result of the proposed action because Lemhi beardtongue is a plant found in sagebrush-grassland community types which are not present in the construction area of Doolittle Creek which is a riparian area with some uplands vegetated by lodgepole pines. In Bender Creek the only species of concern present is the whitebark pine. Whitebark pine is an alpine species and only present at higher elevations in the drainage and not at the barrier location. Further, rotenone has no impacts on aquatic or terrestrial plant species at fish killing concentrations. Some trampling is possible due to increase foot traffic along the proposed streams but the presence of these species in the riparian areas is unlikely. Impacts to any rare or endangered plant species should be minimal because all streams have existing trails or roads that provide good foot and/or vehicular access to the sites and the species of concern do not likely exist at the barrier locations where impacts to vegetation will be the greatest.

Comment 4e: Machinery and equipment used during the project may inadvertently carry noxious weeds to the project site. Proposed mitigation includes washing all equipment and vehicles before entry onto the project site and removal of mud, dirt, and plant parts from project equipment before moving into project area. Subsequent weed monitoring and removal may be performed if warranted.

Cumulative Impacts: Impacts to vegetation from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to vegetation in the proposed native fish restoration streams. If the new fisheries were to attract more recreational use, vegetation could potentially suffer from increase trampling. However, based on other similar native fish fisheries and their limited angling use, FWP would conclude that it is very unlikely that the new WCT fisheries would attract significant interest and associated higher use levels. FWP does not foresee any other activities in the basins proposed for native fish restoration that would add to impacts of the proposed action. As such there are no cumulative impacts to vegetation related to the proposed action.

5. <u>FISH/WILDLIFE</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		yes	5b
c. Changes in the diversity or abundance of nongame species?			X		yes	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?			X		No	5e
f. Adverse effects on any unique, rare, threatened, or endangered species?			X		Yes	5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?			X			5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)			X		Yes	See 5f
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: This project is designed to eradicate brook trout (a game fish) in Doolittle Creek, Bender Creek and Andrus Creek upstream of fish migration barriers. However, these impacts are minor and temporary because WCT (also game fish) would be restocked and repopulate the streams. Therefore, there would be no net loss of habitat occupied by self-sustaining populations

of wild game fish. There would be no proposed changes in the fishing regulations as a result of this project; therefore, once WCT become established there will be a 1 fish limit for cutthroat trout in streams. Rotenone when applied at fish killing concentration has no impact on terrestrial wildlife including birds and mammals that consume dead fish or treated water.

Comment 5c: Non-game non-target species that could be impacted include some aquatic insects and potentially larval stages of amphibians.

Aquatic Invertebrates:

Numerous studies indicate that rotenone has temporary or minimal effects on aquatic invertebrates. The most noted impacts are temporary and often substantial reduction in invertebrate abundance and diversity. In a study of the impacts of a rotenone treatment in Soda Butte Creek in south-central Montana, aquatic invertebrates of nearly all taxa declined dramatically immediately post rotenone treatment; however, only one year later nearly all taxa were fully recovered and at greater abundance than pre treatment (Olsen and Frazer 2006). One study reported that no long-term significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). Some have reported delayed recovery of taxa richness (number of taxa present) following rotenone treatments, but many of these treatments were at higher concentrations than proposed in this treatment (Mangum and Madrigal 1999). Finlayson et al. (2010) summarized high concentrations of rotenone (>100 ppb) and treatments exceeding 8 hours, typically resulted in severe impacts to invertebrate richness and abundance. Conversely, lower rotenone concentrations (<50 ppb) and treatments less than 8 hours, resulted in less impact to invertebrate assemblages. Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for these projects (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of recolonization.

Temporary changes in aquatic invertebrate community structure due to a rotenone treatment could be similar to what is observed after natural (e.g. fire) and anthropogenic (livestock grazing) disturbances (Wohl and Carline 1996; Mihuc and Minshall. 2005; Minshall 2003), though the physical impacts and resulting modifications of invertebrate assemblages after these types disturbances can last for a much longer period than a piscicide treatment. Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996). Headwater reaches and tributaries to the proposed WCT restoration streams that do not hold fish would not be treated with rotenone and would provide a source of aquatic invertebrate colonists that would drift downstream. In addition, recolonization would include aerially dispersing invertebrates from downstream areas (e.g. mayflies, caddisflies, dipterans, stoneflies).

The possibility of eliminating a rare or endangered species of aquatic invertebrate in the proposed streams by treating with rotenone in the formulation of CFT Legumine is very unlikely.

Montana Natural Heritage lists no species of concern or potential species of concern of aquatic invertebrates in either of the streams proposed for WCT restoration. In SW Montana, as part of separate environmental analysis processes, aquatic invertebrates have been routinely collected prior to WCT restoration projects in mountains streams (e.g., Eureka, Little Tepee, Little Tizer, Elkhorn, Crazy, Whitehorse, Soda Butte creeks). In all cases, these collections have shown aquatic invertebrate assemblages typical of headwater streams in southwestern Montana, and in no cases have threatened or endangered species been discovered. FWP expects that the proposed streams contain the same type of aquatic invertebrate assemblages found in other nearby streams and the possibility of eliminating a rare or endangered species is minimal. Aquatic invertebrates would be collected from each stream prior to treatment with CFT Legumine and 1 year post treatment to monitor the recovery of aquatic invertebrate populations.

Based on these studies, FWP would expect the aquatic invertebrate species composition and abundance in the streams proposed for treatment with 1 ppm CFT Legumine (50 ppb rotenone) to return to pre-treatment diversity and abundance within one to two years after treatment. Therefore, the impacts to aquatic invertebrate communities should be short-term and minor.

Birds and Mammals:

Mammals are generally not affected by rotenone at fish killing concentrations because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume rotenone under field conditions is by drinking lake or stream water or consuming dead fish, a half pound animal would need to drink 16 gallons of water treated at 1 ppm to receive a lethal dose of rotenone.

The EPA (2007) made the following conclusion for small mammals and large mammals;

> *When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1,000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g *1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

> *Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 μg/g in yellow perch (Perca flavescens) to 1.08 μg/g in common carp (Cyprinus carpio; Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 μg and 95 μg rotenone per fish, respectively. Based on the avian subacute dietary* LC_{50} *of 4,110 mg/kg, a 1,000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

Amphibians and Reptiles:

Potential amphibians and reptiles found within the proposed treatment areas include: long-toed salamanders (*Ambystoma macrodactylum*), spotted frogs (*Rana pretiosa*), western toads *(Bufo boreas)* (amphibians), tailed frogs (*Ascaphus montanus*) and western terrestrial garter (*Thamnophis elegans*), common garter (*T. sirtalis*) and rubber boa (*Charina bottae*) snakes (reptiles). Rotenone can be toxic to gill-breathing larval amphibians, though air breathing adults are less sensitive. Chandler and Marking (1982) found that Southern Leopard frog tadpoles were between 3 and 10 times more tolerant than fish to Noxfish (5% rotenone formulation). Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs (*Ascaphus truei*), and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 ppm) but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians.

Tailed frogs are present in both Bender and Doolittle creeks but not in Andrus Creek. Tailed frog juveniles remain in fast free flowing streams for multiple years prior to metamorphosing into air-breathing adults. There will likely be short term and minor impacts to tailed frog tadpoles during the removal of brook trout with rotenone. Similar projects have shown that only a portion of the tadpoles present in streams treated with rotenone are killed and adult frogs are not affected. Therefore, it is anticipated that tailed frogs will recover following treatment with rotenone. Further, the short-term reduction in the abundance of fish in the stream should facilitate tailed frog recover by reducing fish predation on tadpoles. Four piscicide projects have been conducted in the Big Hole drainage where tailed frogs have been present and there are no observable impacts of piscicide treatment on densities of juvenile or adult frogs 2 years after treatment.

Columbia spotted frogs and western toads have also been documented in the all 3 drainages proposed for cutthroat restoration. The proposed streams would be scheduled for treatment in August or September, which would reduce but not eliminate potential impacts to larval amphibians. Any reduction in amphibian abundance would be expected to be short term because of the low sensitivity of adults to rotenone, and because most larval amphibians, with the exception of tailed frogs would have metamorphosed by August, when the treatments are planned. Impacts to juvenile tailed frogs can be mitigated by capturing as many as possible and holding them in non-treated waters then releasing them back to the streams once the treatment is complete. Further, adult frogs would not be affected by the stream treatment and could lay eggs in the stream the following year. A reduced abundance of aquatic invertebrates may temporally impact larval and adult amphibians that prey on these species, though the aquatic invertebrate community would recover rapidly. Reptiles (air-breathing) would not be directly impacted by rotenone treatment. Some snakes are known to consume fish from streams; therefore, there could be temporary reduction in available food as a result of the proposed piscicide treatments, but no reptiles present are known to be fish obligates.

Based on this information FWP would expect the impacts to non-target organisms in the streams proposed for WCT restoration to range from non-existent to short term and minor.

Comment 5e.

The proposed action includes the construction of fish barriers in Doolittle, Bender and Andrus creeks. These structures would preclude fish from migrating upstream into the drainage beyond the structures. This could have impacts on fishes downstream that would be blocked from accessing habitat farther upstream including brook trout, longnose suckers, white suckers, Rocky Mountain sculpin, and longnose dace. However, these species are wide spread and locally abundant in the Big Hole; therefore, impeding these species from access to upper reaches of the streams is only considered a minor impact. Fish barriers are necessary to ensure the long-term persistence of westslope cutthroat trout and to ensure that brook trout and other non-native species do not recolonize the restoration area. There are no threatened or endangered fish species in either stream, but WCT are a Species of Concern and FWP believes the benefits to WCT conservation outweigh the negative impacts to fishes that will be blocked from reaching the upper reaches of the streams.

Comment 5f:

Terrestrial Organisms:

The proposed project area is within potential grizzly bear habitat, but there are no known grizzly bears currently inhabiting the areas. This project should have little or no impact on grizzly bears because the bears are not dependent on fish for food. There would be no impact on grizzly bears that consume fish killed by rotenone or consume treated waters (See comment 5c for impacts to mammals). The project would not have an impact on grizzly bears other than potential short term displacement due to increased people presence along the streams.

The project sites are within the range of the gray wolf and lynx. Wolves and lynx are known to be present near the project areas and they may use these areas at times, but they are not dependant on fish from the stream as a food source. The impacts to these species may include temporary displacement during the treatment when personnel and equipment are present in the drainages. However, there should be no impacts from consuming treated waters or fish killed by rotenone for the same reasons as previously noted. Therefore, impacts to lynx and wolves should be minor and temporary. See comment 5c for impacts to mammals.

Wolverine, pigmy rabbit and little brown Myotis (bat), golden eagle, northern goshawk, great blue heron, bobolink, evening grosbeak, Clark's nutcracker and greater sage grouse are listed as species of special concern present in the areas of the proposed action. None of these species should be substantially impacted by the restoration of WCT to the proposed streams. See comment 5g for minor potential impacts.

Aquatic organisms:

Westslope cutthroat trout, including some populations of slightly hybridized WCT, are considered a sensitive species and a species of special concern. The intent of the proposed project is to conserve WCT by removing non-native trout from 3 streams.

Arctic grayling is a SOC and has a Montana state rank of S1 and global rank of G5. It is listed as a Tier I species in the FWP *Fish and Wildlife Conservation Strategy*; meaning that the species is in the greatest conservation need. The US Forest Service Region 1 Regional Forester has designated the Arctic grayling as sensitive on the Beaverhead-Deerlodge National Forest. The species was petitioned for listing under the Endangered Species Act and was a candidate species for several years. In 2014 the USFSW determined that listing the Arctic grayling was not warranted at this time and a lawsuit was filed shortly after objecting to the decision. The fish barriers proposed could impede upstream fish passage in Doolittle Creek which may have an impact on fluvial populations in the Big Hole. However, recent surveys did not find any grayling in Doolittle Creek on the National Forest or any evidence that the stream in this location is used seasonally for spawning and rearing. Therefore, the impact of the barrier structure on grayling should be negligible. Further, there is abundant, high quality habitat in Doolittle Creek downstream of the fish barrier structure on private property for spawning, rearing and seasonal use by adult fish. Grayling have similarly been documented in Andrus Creek but not recently and not within 10 miles of the proposed project area.

Western Pearlshell mussels are also an aquatic species of concern that are known to occur in the vicinity of the proposed project areas. However, no pearlshell mussels have been found in the immediate project areas proposed for WCT restoration. Recent data (Olsen 2014 unpublished data.) suggests that western pearlshell mussels are unaffected by rotenone at fish killing concentrations proposed for these projects.

Comment 5g. There is the potential for displacement of some animals during the implementation of this project (see Comment 5f). Mule deer, elk, other big game species and species mentioned above (Comment 5f) may be temporarily displaced as crews are present in the drainages performing the proposed work. However, these impacts should only be minor and temporary. The total treatment should be completed within 2 or 3 days in each stream. Motorized and foot access is currently present throughout most of the drainages proposed for WCT restoration and public access is present.

Cumulative Impacts: Impacts to fish and wildlife from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create cumulative impacts to fish and wildlife resources within the proposed streams. If the new fisheries attract more recreational use, fish and wildlife resources could potentially suffer from the increased presence of people. However, based on use patterns of other WCT fisheries, FWP concludes that it is very unlikely that the new fisheries would attract significant interest and associated higher use levels. The current brook trout fishery would be replaced by native fisheries that occupy a similar niche and would provide similar ecological functions and provide for similar angling opportunities. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no negative cumulative impacts to non-target organisms related to construction and the treatment of the proposed streams. The restoration would result in a positive cumulative impact in that when combined with other WCT restoration projects, significant progress toward the conservation of these species is being made.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Increases in existing noise levels?			X		Yes	6a
b. Exposure of people to serve or nuisance noise levels?			X		Yes	6b
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: The presence of large machinery in the Doolittle, Bender and Andrus creek drainages to construct the fish barriers will result in increased noise generation. Construction work in the drainage will occur from May through November as conditions allow. Impacts can be mitigated by using muffled machinery and performing work only during daylight hours.

Comment 6b. There are no residences located adjacent to proposed construction areas. The closest residence is approximately 2 miles from the proposed project areas including the fish barrier sites. It is unlikely that any of the noise created during construction will be heard by these residences. Therefore, there is only anticipated to be minimal noise generation that could be considered nuisance at these locations.

Cumulative Impacts: Increases in noise from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would create increased noise in the streams or drainages proposed for restoration. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to noise from the proposed treatment of the proposed streams with piscicides or associated barrier construction.

7. <u>LAND USE</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?			X			See 7c
d. Adverse effects on or relocation of residences?		X				

Comment 7c: During treatment with rotenone, public access to the project areas would be restricted for several days to prevent public exposure to rotenone. The length of the closure would depend on the amount of time the treated streams remained toxic to fish but would not exceed 5 days. The label for CFT Legumine states that detoxification should be terminated when replenished fish survive and show no signs of stress for at least four hours. FWP expects the treated waters to be non-toxic to fish within 24-48 hours after application of rotenone. Therefore, it can reasonably be expected that any closures would last 2 to 4 days total. The treatment would be implemented in late summer (August-September). At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be coordinated such that livestock are pastured elsewhere or livestock would be temporarily moved to adjacent pastures during the treatment period if possible.

Cumulative Impacts: Impacts on land use from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact land use in the proposed restoration streams. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related to land use from the proposed treatment of the proposed streams with piscicides or associated barrier construction.

8. <u>RISK/HEALTH</u> <u>HAZARDS</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**

a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		YES	8a
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?			X		YES	8b
c. Creation of any human health hazard or potential hazard?			X		YES	see 8a,c
d. Will any chemical toxicants be used?			X		YES	see 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators of the CFT Legumine (5% rotenone) and/or Prentox Powder (7% rotenone). All applicators would wear safety equipment required by the product label and MSDS sheets. Such safety equipment may include respirator, goggles, rubber boots (waders), Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. At least one Montana Department of Agriculture certified pesticide applicator would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill. See also Comment 8c for other review of risks to general public.

Comment 8b: FWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, a spill contingency plan, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by FWP the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effect on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are; an additional 10x database uncertainty factor - in addition to the inter-species (10x) uncertainty factor and intra-species (10x) uncertainty factor – has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007);

Exposure Scenario	Dose Used in Risk Assessment, Uncertainty Factor (UF)	Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049)

	aRfD = <u>15 mg/kg/day</u> = 0.015 mg/kg/day 1000		LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = <u>0.375 mg/kg/day</u> = 0.0004 mg/kg/day 1000	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

> *"…When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study*

measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.

Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.

Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table 5). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV)..."

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk: first, the rapid natural degradation of rotenone, second, using active detoxification measures by applicators such as potassium permanganate, third, properly following piscicide labels and the extra precautions stated in this document and finally, proper signing, public notification or area closures which limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application by dermal and incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because treatment areas would be closed to public access. Signs would be in place to warn recreationists that the streams are being treated with rotenone and closed to entry. Proper warning through news releases, signing the project area, temporary road closure and administrative personnel in the project area should be adequate to keep recreationists from being exposed to any treated waters.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo[99] which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk.

Solvents such as toluene, n-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and 1-hexanol were likewise present but either analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of Methyl pyrrolidone in Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis concluded regarding the constituent ingredients in Legumine;

> "…None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physical chemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations…"

The Legumine MSDS states "…when working with an undiluted product in a confined space, use a non-powered air purifying respirator…and… air-purifying respirators do not protect workers in oxygen-deficient atmospheres…" It is not likely that workers would be handling Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira, et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices or involve human health risk precautions as those involved with fisheries management programs.

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the relevance of the results to the use of rotenone as a piscicide have been challenged based upon the following dissimilarities between the experimental methodology used and fisheries related applications: (1) the continuous intravenous injection method used to treat the rats leads to "continuously high levels of the compound in the blood," unlike field applications where 1) the oral route is the most likely method of exposure, 2) a much lower dose is used and 3) potential exposure to rotenone is limited to usually only a matter of days because of the rapid breakdown of the rotenone following application. Further, dimethyl sulfoxide (DMSO) was used to enhance tissue penetration in the laboratory experiment (normal routes of exposure actually slow introduction of chemicals into the bloodstream), no such chemicals enhancing tissue penetration are present in the rotenone formulation proposed for use in this treatment. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1,000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppb and are far below that administered during most toxicology studies.

A recent study linked the use of rotenone and paraquat with the development of Parkinson's disease (PD) in humans later in life (Tanner et al. 2011). The after-the-fact study included mostly farmers from 2 states within the United States who presumably used rotenone for terrestrial application to crops and/or livestock. Rotenone is no longer approved for agricultural uses and is only approved for aquatic application as a piscicide. The results of epidemiological studies of pesticide exposure, such as this one have been highly variable (Guenther et al. 2011). Studies have found no correlations between pesticide exposure and PD (e.g., Jiménez-Jiménez 1992; Hertzman 1994; Engel et al. 2001; Firestone et al. 2010), some have found correlations between pesticide exposure and PD (e.g., Hubble et al. 1993; Lai et al. 2002; Tanner et al. 2011) and some have found it difficult to determine which pesticide or pesticide class is implicated if associations with PD occur (e.g., Engel et al. 2001; Tanner et al. 2009). Recently, epidemiological studies linking pesticide exposure to PD have been criticized due to the high variation among study results, generic categorization of pesticide exposure scenarios, questionnaire subjectivity, and the difficulty in evaluating the causal factors in the complex disease of PD, which may have multiple causal factors (age, genetics, environment) (Raffaele et al. 2011). A specific concern is the inability to assess the degree of exposure to certain chemicals, including rotenone, particularly the concentration of the chemical, frequency of use, application (e.g., agricultural, insect removal from pets), and exposure routes (Raffaele et al. 2011). No information is given in the Tanner et al. (2011) study about the formulation of rotenone used (powder or liquid) or the frequency or dose farmers were exposed to during their careers. There is also no information given about the personal protective equipment used or any information about other pesticides farmers were exposed to during the period of the study. Without information on how much rotenone individuals were exposed to and for how long, it is difficult to evaluate the potential risk to humans of developing Parkinson's disease from aquatic applications of rotenone products.

The state of Arizona conducted an exhaustive review to the risks to human health of rotenone use as a piscicide (Guenther et al. 2011). They concluded: "To date, there are no published studies that conclusively link exposure to rotenone and the development of clinically diagnosed PD. Some correlation studies have found a higher incidence of PD with exposure to pesticides among other factors, and some have not. It is very important to note that in case-control correlation studies, causal relationships cannot be assumed and some associations identified in odds-ratio analyses may be chance associations. Only one study (Tanner et al. 2011) found an association between rotenone and paraquat use and PD in agricultural workers, primarily farmers. However, there are substantial differences between the methods of application, formulation, and doses of rotenone used in agriculture and residential settings compared with aquatic use as a piscicide, and the agricultural workers interviewed were also exposed to many other pesticides during their careers. Through the EPA reregistration process of rotenone, occupational exposure risk is minimized by: new requirements that state handlers may only apply rotenone at less than the maximum treatment concentrations (200 ppb), the development of engineering controls to some of the rotenone dispensing equipment, and requiring handlers to wear specific PPE."

It is clear that to reduce or eliminate the risk to human health, including any potential risk of developing Parkinson's disease, public exposure to rotenone treated water must be eliminated to the extent possible. To reduce the potential for exposure of the public during the proposed use of CFT Legumine to restore WCT, areas treated with rotenone would be closed to public access during the treatment. Signs would be placed at access points informing the public of the closure and the presence rotenone treated waters. Personnel would be onsite to inform the public and escort them from the treatment area should they enter. Rotenone treated waters would be contained to the proposed treatment areas by adding potassium permanganate to the stream at the downstream end of the treatment reach (fish barrier). Potassium permanganate would neutralize any remaining rotenone before leaving the project area. The efficacy of the neutralization would be monitored using fish (the most sensitive species to the chemical) and a hand held chlorine meter. Therefore, the potential for public exposure to rotenone treated waters is very minimal. The potential for exposure would be greatest for those government workers applying the chemical. To reduce their exposure, all CFT Legumine label mandates for personal protective equipment would be adhered to (see Comment 8a).

Cumulative Impacts: Health hazards from the proposed action and the connected action of barrier construction would be short term and mitigated through closure of treatment areas to public and use of proper safety equipment, etc. Because rotenone in all formulations including CFT Legumine breaks down quickly and does not bioaccumulate, there should be no long-term or cumulative impacts of the application of the piscicide. FWP does not expect the proposed action to result in other actions that would increase the risk of health hazards in the streams proposed for restoration. We do not foresee any other activities in the basin that would add to health impacts of the proposed action. As such there are no cumulative impacts related health hazards from the proposed treatments.

9. <u>COMMUNITY IMPACT</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				

c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify: ________________		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. <u>AESTHETICS/RECREATION</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**

a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X			11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: There would be a temporary loss of angling opportunity in Doolittle, Bender and Andrus creeks for several years after treatment as the cutthroat trout repopulate the streams. Bender and Doolittle project areas are accessible to the public and lie entirely on public lands administered by the Forest Service. The lower reaches of Andrus Creek are on private property where there is no public access but the upper reaches of the creek are on Forest Service ground. Once WCT are established and reproducing, they should provide the same angling opportunities as the prior non-native trout fisheries. It should be noted that the proposed streams are small and do not likely receive much angling pressure. Further, there are adjacent streams and areas downstream of fish barriers whose angling opportunities will not have changed as a result of the proposed action. The streams proposed for WCT restoration should be fully colonized with WCT within 5 years of project implementation and should provide the same angling opportunity to catch wild trout as pretreatment.

Cumulative Impacts: Impacts to recreation and aesthetics from the proposed action would be short term and minor. FWP does not expect the proposed action to result in other actions that would impact recreation/aesthetics in the streams proposed for restoration. FWP does not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to recreation/aesthetics from the proposed action.

12. <u>12/HISTORICAL RESOURCES</u> **Will the proposed action result in:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Destruction or alteration of any site, structure or object of prehistoric historic, or paleontological importance?		X				
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				
d. Will the project affect historic or cultural resources?		X				

13. SUMMARY EVALUATION OF SIGNIFICANCE **Will the proposed action, considered as a whole:**	**IMPACT Unknown**	**None**	**Minor**	**Potentially Significant**	**Can Impact Be Mitigated**	**Comment Index**
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which create a significant effect when considered together or in total.)		X				
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		X				
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				
e. Generate substantial debate or controversy about the nature of the impacts that would be created?			X		Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)			X			13f
g. List any federal or state permits required.						13g

Comments 13e and f: The use of piscicide can generate controversy. Public outreach and information programs can inform the public on the use of pesticides and the impacts and risks associated with its use. It is not known if this project would have organized opposition. Similar projects proposed and implemented from 2011-2016 had limited opposition.

Comment 13g: The following permits would be required:

MDEQ Pesticide General Permit

PART IV. OVERLAPPING AGENCY JURISDICTION

A. Name of Agency and Responsibility
   a. Montana Department of Environmental Quality – NDPES Discharge Permit for application of CFT Legumine.

b. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom Ranger District for land management, including grazing management, and temporary closure of areas on Forest Service during treatment.

PART V. AGENCIES THAT HAVE CONTRIBUTED OR BEEN CONTACTED

A. Name of Agency

a. Montana Department of Environmental Quality.
b. Montana Department of Fish, Wildlife & Parks – Wildlife Division
c. Montana Natural Heritage
d. US Forest Service, Beaverhead-Deerlodge National Forest, Wisdom and Dillon Ranger Districts

PART VI. ENVIRONMENTAL IMPACT STATEMENT REQUIRED?

After considering the potential impacts of the proposed action and possible mitigation measures, FWP has determined that an Environmental Impact Statement is not warranted. The impacts of native fish restoration as described in this document are minor and/or temporary and mitigation for many of the impacts is possible. The primary negative impacts as a result of this project are temporary reductions in aquatic invertebrate abundance as a result of toxic effects of rotenone and impacts to tailed frog tadpoles. Impacts to aquatic invertebrates have been shown to be short term (1 to 2 years) and minor and invertebrate communities are very resilient to disturbances such as treatment with rotenone. Mitigation measures such as neutralization of rotenone and not treating sections of stream that do not contain fish but do contain tailed frog tadpoles should reduce the impacts to this non-target species. Further, the benefit to native WCT would balance the potential negative impacts to other species.

Prepared by : Jim Olsen, Fisheries Biologist______ Date: ___March 24, 2017____

Submit written comments to: Montana Fish, Wildlife & Parks
c/o Big Hole WCT Restoration EA comments
1820 Meadowlark Ln.
Butte, MT 59701

Comment period is 30 days. Comments must be received by April 24, 2017.

PART V. REFERENCES

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